

Applicant's claim 1 recites a method of generating power utilizing a gas distribution network and claim 10 recites a satellite assembly for generating power. The gas distribution system is comprised of a high pressure gas reservoir, a low pressure gas delivery pipeline and a conduit operatively connecting the reservoir and the pipeline. The method of generating power includes the step of directing at least a portion of the gas flowing between the high pressure reservoir and a low pressure delivery pipeline through a line, which is free of a heat exchange member driven by a thermal machine, to a satellite assembly to generate power. Importantly, the satellite assembly generates power based upon the flow of gas through the expander and without the combustion of gas.

The unique and novel method and apparatus for generating power in accordance with the present invention provides an extremely economical method and economical apparatus for generating power which utilizes at least a portion of the flow of gas between a high pressure reservoir and the low pressure reservoir or pipeline to generate power without the combustion of the gas. Importantly, the present invention requires that a portion of the gas flowing from the high pressure line to the low pressure line is directed through the satellite assembly or expander to generate power. Accordingly, the power provided by the present invention does not result from the combustion of any gases. Accordingly, the present claimed method

provides an environmentally safe method of generating power as well as an economical method of generating power which utilizes only a portion of the gas flow to generate power.

The Examiner has rejected amended claims 1-8 and 10-16 as being either fully anticipated or obvious over European Patent Publication 0 004 398. However, it is submitted that the '398 teaching is inadequate and lacking on both grounds because it requires "a heat exchange member driven by a thermal machine" to be positioned in the line connecting the high pressure entering the turbine and the low pressure exiting the turbine. Thus, the requirement in this publication of "a thermal machine" renders this teaching severely deficient. This "thermal machine," for example, could be an internal combustion machine, a gas turbine driving an electric current generator, a diesel engine or the like. This is a teaching by this prior art patent that a heat exchanger W is required to be "fed the heat losses of the thermal machine M." Accordingly, the '398 patent teaches that the generation of power is the result of combustion, a reaction between an oxidant and fuel, a teaching absolutely contrary to the present claimed invention.

Specifically, the Examiner is directed to the third paragraph of the translation, which indicates that the utilization of the expansion of the natural gas to drive an electric generator requires that the gas be reheated for its temperature to be maintained at an acceptable value. Accordingly, the '398 method requires the use of at least one-

heat exchanger be arranged in the fuel gas circuit. Accordingly, the '398 patent burns the gas and reduces the pressure of the combustion products through the expander. Such a method and apparatus is absolutely contrary to the specific teaching and the claims of the present invention wherein there is no burning of the gas because the present invention reduces the pressure of the gas by diverting at least a portion of the high pressure gas through the satellite assembly. Thus, '398 patent generates by burning gas and the present invention generates power because of the flow of gas through the expander of the satellite.

Finally, the Examiner's reliance upon EPA '398 is misplaced because the fuel supply to the engine M is not disclosed. Thus, the Examiner should note that the '398 European Patent is designed to distribute gas through a high pressure system of 70 bars, and it is expanded to a low pressure of service, on the order of 1 bar (or atmosphere). One having ordinary skill in the art clearly understands that approximately 20 heat exchangers would be required to reduce the gas pressure from 70 bars to 1 bar. This analysis assumes incorrectly that only heat (Enthalpy) is considered. Other properties and materials necessary for proper analysis of the '398 system are the properties of specific heat with respect to temperature, condensing and freezing points, pressure and entropy. Also, the efficiency of the heat engines disclosed as useful in the '398 patent is about 18 percent. Transferring heat from one machine to another reduces efficiency because the heat becomes

unavailable. Thus, the unavailable energy is about 80 percent for each gas turbine. The differential or flame temperature is 23,875°F, extremely high. At 18 percent efficiency, the flame temperature would approach 4298°F. This temperature exceeds the temperature that can be withstood by the blades and metal of known gas turbine expanders, which of necessity are limited to about 2500°F. Thus, the '398 patent teaching is totally inaccurate and not a solution of the problems solved by the present invention because the '398 must require cooling of the gas before it may enter the satellite. That is the reason for the heat exchangers. Accordingly, the Examiner's conclusion that the '398 patent anticipate or renders obvious the present claimed invention is respectfully overcome.

Also, the '398 patent does not illustrate or disclose the specifics of the internal combustion engines except that it describes that they are there, no fuel input conditions are shown and no flue gas exit conditions are described. Also, a stack or chimney is necessary. The unavoidable losses in an internal combustion engine which drives the heat exchangers will affect the temperature of the gas. The gas losses are from combustion, the water formed, the CO₂ and other gases formed, and the temperature of the flue gas to the chimney. The radiation and conduction from the thermal machine, the electricity generated by the generators and expanders and the losses of all the generators result in a situation where the French patent will not permit operation except with a heat exchanger in the system.

Accordingly, applicant's claims, which specifically exclude a heat exchanger member as being driven by a thermal machine, is a valid limitation to the method and apparatus which clearly distinguishes the claimed inventions from the prior art.

Additionally, applicant respectfully requests the Examiner to reconsider the further arguments presented in the Preliminary Amendment filed with the Patent Office on December 11, 1998. Suffice to say, the present invention relates to a method of generating power without combustion of gas, a result which simply cannot be obtained or achieved by the Examiner's references. Hence, the Examiner's prior art teaching of the requirement of the need for a heat exchanger coupled to a combustion engine or another type of thermal machine to assist the distribution of system is not a teaching of the present claimed invention, but is antithetical thereto.

For each and all of the reasons set forth above with respect to distinguishing the features of the present invention over the '398 patent, it is respectfully submitted that claims 1-8 and 10-16 are in condition for allowance.

Respectfully submitted,

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